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Pycnogonids under infralitoral stones at Cape Savudrija, Northern Adriatic Sea

(Pantopoda, Ammotheidae)

Maria F. Montoya Bravo, Leonie Meltzer, Roland Meyer & Roland R. Melzer

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During 8 collection trips between September 2004 and August 2005, we found 58 pycnogonids all belonging to the family Ammotheidae (*Achelia langi* (Dohrn, 1881), *Ammothella appendiculata* (Dohrn, 1881), *Ammothella longioculata* (Faraggiana, 1940), *Ammothella biunguiculata* (Dohrn, 1881)) under stones and small rocks at Cape Savudrija, Northern Adriatic Sea. Species composition and relative abundance differ strongly from earlier pycnogonid samples generally taken from brown algae, hydrozoan colonies or dredge material.

Maria F. Montoya Bravo, Leonie Meltzer, Roland Meyer, Roland R. Melzer, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany; phone: +49-89-8107-141, fax: +49-89-8107-300, e-mail: melzer@zsm.mwn.de

Introduction

At Cape Savudrija (15°28'N, 13°23'E), Northern Adriatic Sea (Croatia), one finds a shoal small bay of a depth of about 1 m exposed northwards (Fig. 1A). The ground of the bay (Fig. 1B) is filled with stones, small rocks, and sand below and between. The exposed parts of the stones are partly covered with algae and zoobenthos. Under the stones, a sheet of biogenous limestone is developed partly overgrown by sessile forms such as bryozoans and sponges. Between the stones, numerous individuals of *Anemonia viridis* (Anthozoa) are observed. While snorkling and "turning stones" in this bay, we found a remarkably high amount of ammotheid pycnogonids sitting under stones, well masked on the light brown limestone sheet and benthos organisms (Fig. 1C).

As most pycnogonid samples in the Mediterranean Sea in the past were collected from brown algae (*Halopteris*, *Cystoseira* and *Dictyota*), hydrozoan colonies (*Eudendrium*) or from dredge material, we studied the infralitoral under-stone-communities in a more detailed way, and made 8 samples showing a species composition and relative abundance that is quite different from other pycnogonid samples collected in this area. It is indicated that the under stone habitat is an ammotheid domain with species only rarely found in other habitats. Previous studies on the pycnogonid fauna of the Northern Adriatic coast of Croatia have been made around Rovinj, about 40 km south of Cape Savudrija (Zavodnik 1968, Krapp-Schickel & Krapp 1975, Schüller 1989).

Material and methods

While snorkling at Cape Savudrija, stones and small rocks were turned around and inspected either in the water or after taking them out. Pycnogonids were seized by hand or with forceps and fixed in 70 % ethanol. Altogether, we made 8 afternoon collection trips (3.9.2004, 8.10.2004, 28.12.2004, 25.1.2005, 25.4.2005, 22.5.2005, 8.8.2005, 15.8.2005), each of a duration of between 1 and 2 hours. Up to a third of the identified pycnogonids were washed away by the sea before they could be seized. In addition it was not easy to see the animals as they have the same colour as the stones they are sitting on. Hence, we assume that less than a half of the indi-

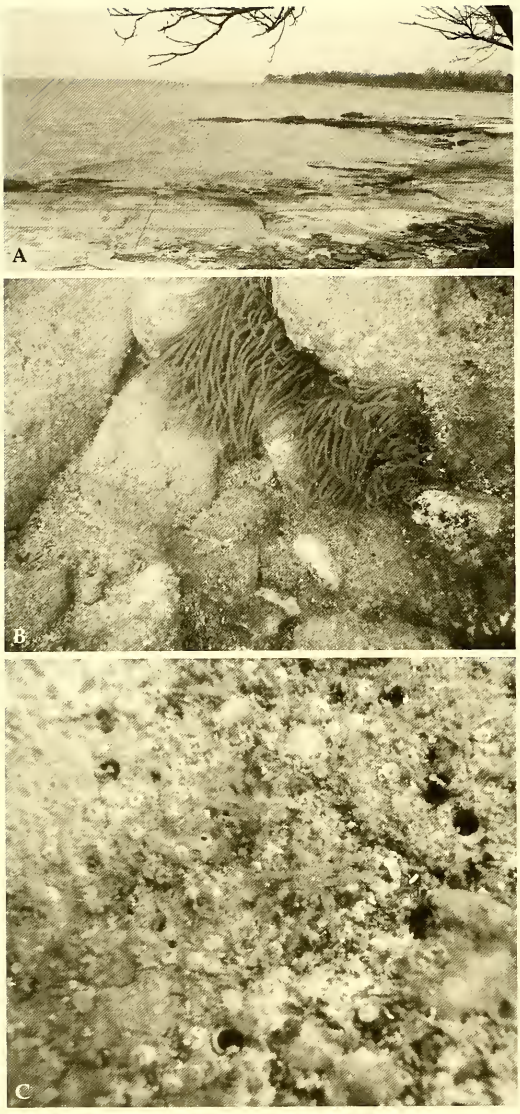

Fig. 1. **A.** The small bay at Cape Savudrija where our samples were collected. **B.** Underwater picture of the stones where the pycnogonids were found, and *Anemonia viridis* in between. **C.** *Achelia langi* at its original place under a stone bearing a layer of biogenous limestone with various benthos organisms. Note very similar colour of stone and pycnogonid (all pictures were taken in April 2005).

viduals sitting under the examined stones were collected. For documentation we used Canon Ixus 400 and Olympus 8080 digital cameras.

The collected Ammotheidae

Achelia langi (Dohrn, 1881)

Material:

3.9.2004: 3♀♀, A20042378 (Bavarian Sate Collection's storage number), A20042375 and A20042374; 2♂♂, A20042373 and A20042378.

8.10.2004: 1♀, A20050117, 1♀ with developed eggs, A20050112; 1♀ with chelae and developed eggs, A20050115; 2♂♂, A20050111 and A20050113; 2 egg-carrying ♂♂, A20050115 and A20050114.

25.1.2005: 1♂, A20050118.

24.4.2005: 4♀♀, A20051895, A 20051894, A20051897 and A20051898; 1♂ carrying eggs; 1♂, A20051901; 3 juveniles, A20051899, A 20051896 and A20051895.

22.5.2005: 2♂♂, A20051906 and A20051904; 5 juveniles, A 20051905, A20051908, A20051900, A20051903, and A20051907.

8.8.2005: 6♀♀, A20051963 and A20051961; 1 egg-carrying ♂, A20051961; 5♂♂, A20051961.

15.8.2005: 1♀, A20051965.

Additional material from the Rovinj area:

6.10.2004: 1♀, A20050129 (under stone at Punta Currente, at a depth of approx. 1.5 m).

9.8.2005: 1♂, A20051966 (under stone in Cross Bay, at a depth of approx. 0.5 m)

Remarks. In previous samples, *Achelia echinata*, *A. simplex* and *A. vulgaris* have been found along the Northern Adriatic East coast with *A. echinata* being the most common species of this genus (Zavodnik 1968, Krapp-Schickel & Krapp 1975, Krapp 1975, Schüller 1989), but not *A. langi*, and hence this species is new for the area, probably because the applied collection technique has not been used there before. In our samples, *A. langi* is the most abundant understone-pycnogonid (72 % of the whole sample). Altogether, we found 42 individuals, 17 of these are ♀♀, 17♂♂ and 8 are juveniles. 4♂♂ were carrying eggs. Remarkably the latter were found in April, August and October, i.e. in various times of a year, while juveniles were only found in April and May. We found one ♀ still having chelae but already bearing eggs in her legs in October. We have two additional individuals of *Achelia langi* from the Rovinj area, where we also found them under stones.

Ammothella appendiculata (Dohrn, 1881)

Material:

8.10.2004: 1♀, A20051891.

28.12.2004: 1 juvenile, A20051892.

22.5.2005: 1 egg carrying ♂, A20051890.

Remarks. *A. appendiculata* has also been found by Krapp-Schickel & Krapp (1975) and Schüller (1989) in the Rovinj area. However, this species is quite rare in their collections. The three individuals we found represent 5 % of our sample.

Ammothella longioculata (Faraggiana, 1940)

Material:
3.9.2004: 1♂, A 20042376; 1 juv., A 20042377.
8.8.2005: 2♂♂, 1♀ with eggs in femur, A20051962; 3 juveniles, A20051960.

Remarks. This species has been found in the Northern Adriatic for the first time by Schüller (1989), and in general has been seldomly collected in the Mediterranean (earlier reports are summarized in Schüller 1989). Our 8 specimens confirm Schüllers (1989) observation. However under stones this species is not as rare as one might think, as almost 14 % of the whole sample is made by *A. longioculata*.

Ammothella biunguiculata (Dohrn, 1881)

Material:
8.10.2004: 1♀, A20050120; 1 juv., A20050121.
25.1.2005: 1♂, A20050119.
8.8.2005: 2 juveniles, A 20051964.

Remarks. This species has also been found in this area for the first time by Schüller (1989). She could find only one single juvenile. In our samples we have five individuals of this species, i.e. 8% of the whole sample. Hence this species as well is more common under stones than in other habitats.

Conclusions

Under stones at Cape Savudrija a pure ammotheid community is present. The three *Ammothella* species were rarely found in earlier studies. *Achelia langi*, the most common species in our samples, is new to the Croatian Northern Adriatic coast. This indicates that *A. langi* might have been overseen in the past because of the applied sampling techniques. This also accounts for our other ammotheids, and hence it seems that "rareness" does not necessarily mean rareness of the respective species here: if the appropriate "sample trick" is not applied, a quite common species can be overseen. In other words, it seems that we have found a facet of the habitat of the collected species that was not studied before.

This might explain the differences in species composition and relative abundance between the present study and earlier works. E.g., in Schüllers (1989) study, where most specimens were collected from infralitoral algae, ammotheids represent 10 % of the whole sample, while ours completely consists of ammotheids. 72 % of these are *Achelia langi*, the remaining 28 % of the collected pycnogonids are *Ammothellas*, while Schüller had less than 3 % *Ammothellas* in her sample. In addition in Schüller's sample about 80 % of the collected ammotheids are *Achelia echinata*. The latter species is generally seen as a quite common *Achelia*. Under stones, however, we haven't found a single individual of this species, but *Achelia langi* takes the place of the most common ammotheid and the dominant species of our whole sample.

What might be the reason why ammotheids sit under stones at cape Savudrija? Generally the stones might be resting sites or foraging grounds or both. Our qualitative habitat description (see above) indicates that with algae on top and at the sides of the stones, with the Anemonias between them, and the coelenterates, bryozoans and other dim light benthos organisms growing under the stones, potential food for the collected ammotheids is present very close to the places where we found them.

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